S P E C I F I C A T I O N

Title of the Invention

DEVICE AND METHOD FOR PREVENTING SKIDDING OF A CONTAINER

Background of the Invention

The present invention generally relates to containers. More particularly, the present invention relates to the conveying of containers.

In container filling and packaging operations, containers are guided by surfaces, such as rails, that are adjacent side walls of the containers. As a container is conveyed against an adjacent surface, the container typically "skids" along the surface on its way to an intended destination. In a case of a round container, the round container experiences little or no rotation as it skids along the adjacent surface.

For example, in a rotary-style heater/cooler that has a horizontal cylindrical rotating portion that horizontally rotates on its center axis, containers are housed within carrier pockets located about an interior surface of the rotating portion. The carrier pockets comprise rails that generally restrict the containers' movement in each direction, yet permit the containers to move some and to rotate within the carrier pockets.

As the rotating portion rotates, the containers move in a spiral path along the length of the horizontal cylindrical rotating portion. Containers that are located in a lower part of the rotary-style heater/cooler are in contact with an exterior rail toward an exterior of the rotating portion due to gravity. For round containers, the frictional forces between the side walls of the containers and the exterior rail have a tendency to rotate the containers against the exterior rail. In other words, as the rotating portion rotates about its center axis, a round

container has a tendency to rotate about its center axis while it is positioned in a lower part of the rotating portion. This rotation causes some mixing of the contents of the containers to assist heat transfer through the contents during heating or cooling of the container and its contents. Due to the low coefficients of friction of typical container and typical exterior rails, however, the containers have a tendency to skid along the exterior rails. Therefore, the containers do not typically continuously rotate while in the lower portion of the heater/cooler.

Also, frictional defects, such as abrasions and scuff marks, can occur on the side walls of the containers as the containers skid along the adjacent surface

Accordingly, typical containers and typical exterior rails do not provide enough frictional forces to provide enough rotation to sufficiently mix some contents or to effect efficient heat transfer throughout the contents. Further, this phenomenon is not limited to rotary-style heaters/coolers and typically occurs when containers travel against adjacent surfaces.

Summary of the Invention

The present disclosure provides one or more inventions directed to preventing skidding of containers on adjacent surfaces. These improvements can be practiced jointly or separately.

To this end, in an embodiment, there is provided a container comprising a side wall having an exterior surface with at least one friction portion effective to prevent skidding of the side wall on a surface adjacent the side wall.

In an embodiment, the friction portion encompasses substantially all of the exterior surface of the side wall.

In an embodiment, the friction portion encompasses less than the entire exterior surface of the side wall, the friction portion having a coefficient of friction that is higher than that of a remainder of the side wall.

In an embodiment, the friction portion comprises a stippled surface protruding from the side wall.

In an embodiment, the friction portion comprises wall members positioned about the side wall, the wall members being protrusions from the side wall and effective to engage complementary protrusions of the surface adjacent the side wall.

In an embodiment, the friction portion is integral to the exterior surface of the side wall.

In an embodiment, the friction portion is an embossed structure on the exterior surface of the side wall.

In an embodiment, the friction portion is attached to the exterior surface of the side wall.

In an embodiment, the container comprises at least one of metal, plastic, and glass.

In an embodiment, the container comprises a plurality of friction portions on the exterior surface of the side wall. In an embodiment, the friction portions encompass less than the entire exterior surface of the side wall, each of the friction portions having a coefficient of friction that is higher than that of a remainder of the side wall.

There is also provided, in an embodiment, an anti-skid device comprising an engagement surface having a friction portion effective to prevent skidding of a container against the engagement surface.

There is also provided, in an embodiment, a method of preventing skidding of a container having a side wall on a surface adjacent the side wall. The method comprises the

steps of: providing a container having a side wall with an exterior surface; and providing a surface adjacent the exterior surface of the side wall, wherein at least one of the exterior surface of the side wall and the surface adjacent the exterior surface of the side wall comprises a friction portion effective to prevent skidding of the exterior surface of the side wall on the surface adjacent the exterior surface of the side wall.

There is also provided, in an embodiment, a method of preventing skidding of a container having a side wall on a surface adjacent the side wall. The method comprises the steps of: providing a container having a side wall with a friction portion; and providing a surface adjacent the side wall, the friction portion effective to prevent skidding of the side wall on the surface adjacent the side wall.

There is also provided, in an embodiment, a method of preventing skidding of a container having a side wall on a surface adjacent the side wall. The method comprises the steps of: providing a container having a side wall; and providing a surface adjacent the side wall, the surface adjacent the side wall having a friction portion effective to prevent skidding of the side wall on the surface adjacent the side wall.

These and other features of the present invention will become clearer with reference to the following detailed description of the presently preferred embodiments and accompanying drawings.

Description of the Drawings

FIG. 1 is a side elevational view of a container constructed in accordance with the present invention.

FIG. 2 is a side elevational view of the container of FIG. 1 adjacent exterior rails.

FIG. 3 is a side elevational view of the container of FIG. 1 having a friction portion in accordance with an embodiment of the present invention.

FIG. 4 is a side elevational view of the container of FIG. 1 having a friction portion in accordance with another embodiment of the present invention.

FIG. 5 is a perspective view of the container of FIG. 1 within a rotary-style heater/cooler in accordance with an embodiment of the present invention.

FIG. 6 is a sectional view of a rotary-style heater/cooler.

FIG. 7 is a side elevational view of a plurality of containers within a rotary-style heater/cooler in accordance with embodiments of the present invention.

FIG. 8 is a perspective view of an exterior rail in accordance with an embodiment of the present invention.

FIG. 9 is a perspective view of an exterior rail in accordance with another embodiment of the present invention.

Detailed Description of the Presently Preferred Embodiments

As described above, there is provided a device and method for preventing skidding of a side wall of a container on an adjacent surface.

In FIG. 1, there is depicted an illustrative container 100 constructed in accordance with the present invention. As illustrated, the container 100 has a bottom portion 102, a side wall 104 having a shoulder 106, and a neck 108. An opening in the neck 108 of the container 100 can be closed by any suitable structure. For example, as illustrated, the neck 108 can have threads 110 for engaging a closure (not shown).

The container 100 is not limited to the illustrated shapes and topologies and can embody shapes and/or topologies different from those illustrated. For example, the container 100 can have a handle. Further, the container can conform to an industry-standard shape, such as, a shape that meets the specifications of an industry-standard #10 can.

The container 100 can comprise any suitable material or combination of materials. For example, the container can comprise at least one of metal, plastic, and glass.

A first friction portion 112 and a second friction portion 114 are formed about the side wall 104. In the illustrated embodiment, there are two friction portions 112 and 114. In alternate embodiments, there can be one or more friction portions formed about the side wall 104. In an embodiment, the container 100 can have a single friction portion encompassing substantially all of the side wall 104. The first friction portion 112 and the second friction portion 114 are depicted as horizontal bands formed about the circumference of the container 100. Alternatively, the friction portions can be formed to any shape that is suitable to provide friction on an adjacent surface. For example, the friction portion can be formed as a spiral about the container's circumference and along the side wall 104, a pattern of disconnected friction portions, or bands that do not have linear edges.

In the illustrative embodiment, the friction portions 112 and 114 are separated by other portions of the side wall 104. The friction portions 112 and 114 may have coefficient of friction values that are larger than coefficient of friction values of the remainder of the side wall 104, however, the coefficient of friction values of the friction portions 112 and 114 may be equal to the coefficient of friction values of the other portions of the side wall 104. Also, the friction portions 112 and 114 can each have different coefficient of friction values.

The friction portions 112 and 114 can be, for example, integral to the side wall 104. In this case, the friction portions 112 and 114 can be, for example, texturing formed or embossed on the side wall 104. The texturing can comprise, for example, stippling, projecting or raised portions, or a rough surface.

Alternatively, the friction portions 112 and 114 can be devices attached to the side wall 104. In this case, the friction portions 112 and 114 have textured outer surfaces. The

texturing can comprise, for example, stippling, projecting or raised portions, or a rough surface. Additional embodiments of friction portions 112 and 114 are described below with reference to FIGs. 3 and 4.

A recessed portion 116 is formed between the first friction portion 112 and the second friction portion 114. In alternate embodiments, the container 110 does not have a recessed portion 116, or the container has a plurality of recessed portions 116.

In the illustrative embodiment, the friction portions 112 and 114 of side wall 104 have a coefficient of friction value that is greater than a coefficient of friction value of a remainder of the side wall 104. Accordingly, when the friction portions 112 and 114 contact an adjacent surface, such as a rail in a rotary-style heater/cooler, the friction portions 112 and 114 provide more friction against the rail than would be provided by the remainder of the side wall 104.

FIG. 2 depicts the container 100 contacting against a first adjacent surface 200 and a second adjacent surface 202. In the illustrated embodiment, the first adjacent surface 200 is a surface of a first exterior rail 204 of a rotary-style heater/cooler. The second adjacent surface 202 is a surface of a second exterior rail 206 of the rotary-style heater/cooler.. Alternatively, the first adjacent surface 200 and the second adjacent surface 202 can be any surface that is adjacent the side wall 104 of the container 100.

As illustrated, the first friction portion 112 contacts against the first adjacent surface 200 and the second friction portion 114 contacts against the second adjacent surface 202. Since the container 100 has friction portions 112 and 114, which have a coefficient of friction value that is greater than the coefficient of friction value of the remainder of the side wall 104, there is a greater amount of friction between the container 100 and the adjacent surfaces 200 and 202 than there would be between a typical container and the adjacent surfaces 200

and 202. Accordingly, the container 100 is less likely to skid against the adjacent surfaces 200 and 202 than a typical container that does not have a friction portion.

FIG. 3 depicts a first embodiment of the friction portions of the container 100. In the illustrated embodiment, the first friction portion 112 comprises a rough surface, such as, for example, a stippled surface. The stippled surface can be, for example, MT11100 standard texturing.

FIG. 4 depicts another embodiment of the friction portions of the container 100. In the illustrated embodiment, the first friction portion 112 comprises a number of gear teeth or ribs 400 formed about a circumference of the side wall 104. The ribs 400 are at least partially aligned in a direction of a height or longitudinal axis of the container 100. Alternatively, the ribs 400 can have a different alignment. In an embodiment, a surface that is adjacent the friction portions can have complementary ribs formed thereon to engage the ribs 400 of the friction portions, as will be described in more detail below.

Although the first friction portion 112 is depicted in FIGs. 3 and 4, the illustrated embodiments can also disclose any other friction portions of the container 100, such as the second friction portion 114. Further, in alternate embodiments, the friction portions can have configurations that are different from those illustrated in FIGs. 3 and 4. For example, the friction portions can comprise a plurality of connected or disconnected protrusions of any shape that is suitable for providing a desired coefficient of friction.

The above-described container 100 provides a side wall having a larger coefficient of friction value than typical containers. This provides advantages over typical containers when a side wall having a large coefficient of friction value is desired. For example, when a container is heated/cooled in a rotary-style heater/cooler, it is beneficial for the container's side wall to have a large coefficient of friction in order to prevent skidding of the container

on the exterior rails of the rotary-style heater/cooler. FIG. 5 depicts a perspective view of the container 100 within a rotary-style heater/cooler in accordance with an embodiment of the present invention. The rotary-style heater/cooler is designated generally as item 500.

As described above, and referring to FIG. 6, the rotary-style heater/cooler 500 has a horizontal cylindrical rotating portion 600 that rotates on its center axis. The illustrative rotating portion 600 is depicted to rotate in a counter-clockwise direction, as indicated by the arrow, however, the rotating portion 600 can alternatively rotate in a clockwise direction. A plurality of containers 100 are housed within carrier pockets 508 located about an interior 602 of the rotating portion 600.

Referring back to FIG. 5, a container 100 is housed within a carrier pocket 508 in a space that has boundaries comprising the first exterior rail 204, the second exterior rail 206, a first inner rail 502, and a second inner rail 504. The first inner rail 502 and the second inner rail 504 are connected via a mounting rail 506. The carrier pockets 508 are large enough, however, to permit the containers 100 to move some and to rotate within the carrier pockets 508. The first exterior rail 204 and the second exterior rail 206 are formed such that the containers move in a spiral path 604 along the length of the rotary-style heater/cooler 500 as the rotating portion 600 rotates.

Fig. 7 depicts a cross-sectional view of the rotating portion 600. As the rotating portion 600 rotates, containers 100 that are located in an upper part 700 of the rotary-style heater/cooler 500 are carried by an inner rail 502 or 504. The upper part 700 comprises a distance of approximately 220 degrees around the periphery of the rotating portion 600. While the containers 100 are carried, the containers 100 rest against the inner rail 502 or 504 and, for the most part, do not rotate.

Containers 100 that are located in a lower part 702 of the rotary-style heater/cooler 500 are in contact with the exterior rails 204 and 206 due to gravity. The frictional forces between the side walls 104 of the containers 100 and the exterior rail 204 and 206 cause the containers 100 to rotate against the exterior rails 204 and 206. This is depicted by the rotation arrows illustrated within the containers 100. In a transition part 704 that is between the upper part 700 and the lower part 702, the containers 100 will rotate when they are in contact with the exterior rails 204 and 206.

In the lower part 702 and in the transition part 704, a typical container, however, has a tendency to skid against the rail due to the coefficients of friction of typical container side walls and typical exterior rails. In accordance with embodiments consistent with the present invention, however, the friction portions 112 and 114 of the side walls 104 of the containers 100 have a coefficient of friction value that is large enough to prevent the container 100 from skidding along the exterior rails 204 and 206. Instead, the friction portions 112 and 114 grip the adjacent surfaces 200 and 202 of the exterior rails 204 and 206, respectively, causing the containers 100 to continuously rotate while in the lower part 702 and transition part 704 of the rotary-style heater/cooler 500. This continuous rotation advantageously causes the contents of the containers 100 to mix and, therefore, assists heat transfer through the contents during heating or cooling of the containers 100 and their contents. Further, since the side walls 104 of the containers 100 do not skid along the adjacent surfaces 200 and 202, frictional defects, such as abrasions and scuff marks, are reduced.

In alternate embodiments of the present invention, friction portions, as described above, are be provided on surfaces adjacent the container 100 instead of or in addition to being provided on the side wall 104 of the container 100. Illustrative embodiments of the present invention that provide friction portions on adjacent surfaces are depicted in FIGs. 8

and 9. FIG. 8 illustratively depicts the first external rail 204 of the rotary-style heater cooler 500. In the illustrated embodiment, the first external rail 204 comprises a rough surface, such as, for example, a stippled surface. As illustrated, a friction portion 800 is formed on the first adjacent surface 200. The stippled surface can be, for example, MT11100 standard texturing. As the container 100 moves along the first adjacent surface 200, the friction portion 800 prevents skidding of the container 100 on first adjacent surface 200.

FIG. 9 depicts an embodiment wherein an alternative friction portion 900 is formed on the first adjacent surface 200. The friction portion 900 comprises a number of gear teeth or ribs 902 that protrude from first adjacent surface 200. The ribs 902 are at least partially aligned in a direction of a height or longitudinal axis of the container 100. Alternatively, the ribs 902 can have a different alignment. In a case wherein the container 100 has complementary ribs 400 formed thereon, as depicted in FIG. 4, the ribs 902 of the first adjacent surface 200 engage the ribs 400 of the container 100.

One of skill in the art will appreciate that the shapes of the friction portions 800 and 900 are merely illustrative and, similar to the friction portions 112 and 114, the friction portions 800 and 900 can have alternative configurations. For example, the friction portions can comprise a plurality of connected or disconnected protrusions or rough surfaces of any shape that is suitable for providing a desired coefficient of friction.

Further, the friction portions (e.g. friction portions 800 and 900) can be on surfaces other than on the exterior rails of a rotary-style heater/cooler. The friction portions can be formed on any surface that is adjacent the container 100, such as, on a conveyer, equipment rail, guard, wall, or base plate.

Therefore, the present apparatus and methods inventively reduce skidding between containers and adjacent surfaces compared to typical containers and adjacent surfaces.

As is apparent from the foregoing specification, the present invention is susceptible to being embodied with various alterations and modifications which may differ particularly from those that have been described in the preceding specification and description. It should be understood that it is desired to embody within the scope of the patent warranted herein all such modifications as reasonably and properly come within the scope of the presently defined contribution to the art.